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<p>(21) International Application Number: PCT/EP95/04231</p> <p>(22) International Filing Date: 27 October 1995 (27.10.95)</p> <p>(30) Priority Data: VI94A000156 28 October 1994 (28.10.94) IT VI95A000024 10 February 1995 (10.02.95) IT</p> <p>(71) Applicant (<i>for all designated States except US</i>): LA.I.CA. LAVORAZIONE ITALIANA CASALINGHI S.N.C. DI ZAMBERLAN TERESA & C. [IT/IT]; Viale del Lavoro, 10, I-36020 Ponte di Barbarano (IT).</p> <p>(72) Inventor; and (75) Inventor/Applicant (<i>for US only</i>): MORETTO, Leonida [IT/IT]; Via Tormeno, 235, I-36100 Vicenza (IT).</p> <p>(74) Agent: CANTALUPPI, Stefano; Jacobacci & Perani S.p.A., Via Berchet, 9, I-35131 Padova (IT).</p>		<p>(81) Designated States: AL, AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG).</p> <p>Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>	
<p>(54) Title: A VESSEL FOR FILTERING LIQUIDS, PARTICULARLY DRINKING WATER</p> <p>(57) Abstract</p> <p>A vessel for filtering liquids, particularly drinking water, comprises a container (5) for the liquid to be filtered with an openable lid (8), a counting device (15) being associated with the lid (8) for detecting and counting the occasions on which access is gained to the container (5) in order to indicate the need to renew the filtering system.</p> <img alt="Technical drawings of a vessel for filtering liquids. The top drawing shows a side view of the vessel with lid (8) closed, featuring a handle (1), a base (2), and a central opening (3). The bottom drawing is a cross-sectional view of the lid (8) showing internal components: a base plate (11), a central filter assembly (12), and a counting mechanism (15) consisting of a gear (16), a wheel (17), and a counter (18). Various other parts are labeled with numbers such as 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 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58950, 58951, 58952, 58953, 58954, 58955, 58956, 58957, 58958, 58959, 58960, 58961, 58962, 58963, 58964, 58965, 58966, 58967, 58968, 58969, 58970, 58971, 58972, 58973, 58974, 58975, 58976, 58977, 58978, 58979, 58980, 58981, 58982, 58983, 5			

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A vessel for filtering liquids, particularly drinking water.

Technical field

The subject of the invention is a vessel for filtering liquids, particularly drinking water, according to the preamble to the main claim.

The vessel is of the type which has a replaceable filter cartridge and in which, to ensure efficient filtering, the filter cartridge has to be removed and replaced after a certain number of cycles and/or after a predetermined period of time.

Background art

According to the prior art, it is up to the user to remember to replace the cartridge once its filtering capacity must be considered exhausted. However, it may not be at all easy to remember the number of filtering cycles carried out after the last replacement of the cartridge.

The object of the invention is to provide a filtering vessel, the structure and operation of which are such as to facilitate the user's task of monitoring the efficiency of the filter cartridge in order to replace it once the useful filtering cycles provided for have been carried out.

Disclosure of invention

This object is achieved by a vessel formed in accordance with the claims below.

Short description of drawings

The characteristics and advantages of the invention will become clearer from the detailed description of some preferred but not exclusive embodiments thereof illustrated in the appended drawings, in which:

Figure 1 is a front elevational view of a vessel according to the invention shown in partial section,

Figure 2 is a partially-sectioned plan view of a detail of the vessel from above,

Figure 3 is a partially-sectioned perspective view of a further detail of the same vessel from above,

Figure 4 is an exploded perspective view of the detail of Figure 3 from below,

Figure 5 is a longitudinal section of a first variant of the vessel of the previous drawings, shown only partially,

Figure 6 is a section taken on the line VI-VI of Figure 4,

Figure 7 is a partially-sectioned plan view of the vessel of Figures 5 and 6 from above,

Figure 8 is a longitudinal section of a second variant of the vessel of the previous drawings, shown only partially,

Figure 9 is a section taken on the line IX-IX of Figure 8,

Figure 10 is a partially-sectioned plan view of the vessel of Figures 8 and 9 from above,

Figure 11 is a longitudinal section of a third variant of the vessel of the previous drawings, shown only partially,

Figure 12 is a section taken on the line XII-XII of Figure 11,

Figure 13 is a partially-sectioned plan view of the vessel of Figures 11 and 12 from above,

Figure 14 is a longitudinal section of a fourth variant of the vessel of the previous drawings, shown only partially,

Figure 15 is a section taken on the line XV-XV of Figure 14,

Figure 16 is a partially-sectioned plan view of the vessel of Figures 14 and 15 from above,

Figures 17, 18 and 19 are partially-sectioned side elevational views of three further variants of the vessel of the invention.

Embodiments of the invention

In Figures 1 to 3, a vessel according to the present invention is generally indicated 1; it comprises a jug 2 with a handle 3 and a spout 4 for pouring out the filtered water, a funnel-shaped container 5 housed in the jug 2 and supported with form coupling in a mouth portion 7 thereof and a lid 8 positioned removably for closing the container 5.

The container 5 defines, in known manner, a receptacle 9, in the base of which there is a housing 10 for a filter cartridge 11 replaceable, for example, after a predetermined number of filtering cycles. By way of indication, it may be assumed that the cartridge 11 is arranged to perform thirty filtering cycles and has to be replaced upon completion of the thirtieth cycle.

A plate-like catch projection 12 projects radially inwardly from the wall of the receptacle 9 of the container 5 on the side facing the spout 4.

According to the invention, the lid 8 has a device, generally indicated 15, for counting the number of filtering cycles carried out by the cartridge 11. The device 15 comprises a display disc 16 which is rotatable about a peg 17 integral with the lid 8 and is urged resiliently against the facing wall 21 of the lid 3 by means of a helical spring 18 which abuts the head of a pin 19 driven into the peg 17.

A scale 22 graduated in numbered sectors is printed on the face of the disc 16 facing the wall 21; for each

sector of the scale 22 the outer edge of the disc 16 has a respective trapezoidal tooth 23 with a face 24 which is substantially vertical or is disposed in a plane containing the axis of rotation of the disc, and with two sides 25a, 25b tapered like inclined planes. The teeth are spaced apart by respective recesses with flat bases 26.

One of the recesses 26 between two adjacent teeth of the disc 16 is at least partially blocked by a bridge 27 provided for stopping the disc 16 upon completion of a predetermined rotation as will be explained further below. In the embodiment illustrated, the bridge 27 is shown in a fictitious angular position, purely by way of example and for clarity of the drawing; it would actually be diametrically opposite the sector bearing the word "STOP" and hence in a position not visible in the drawing.

The opposite face of the disc 16 has a grip 28 (which serves for the manual rotation of the disc 16) and an opposed indicator arrow 29.

In addition to the peg 17, the wall 21 of the lid 8 has a window 30 extending through the lid to enable the scale 22 to be seen from outside the container 5, an indicator arrow 31 which is intended to correspond to the arrow 29 for the initial positioning of the disc 16 after the filter cartridge 11 has been replaced, a unidirectional stop tooth 32 for the disc 16 to prevent it from rotating backwards and two appendages, indicated 33 and 34, respectively. The appendage 33 serves as a shoulder for a spring 35 which urges a pawl 36 resiliently into

abutment against the appendage 34. The pawl 36 is supported for pivoting on the peg 17 and bears a unidirectional stop tooth 37 for advancing the disc as well as a cam profile 38 with a ramp or inclined plane which can cooperate with the catch projection 12 of the receptacle portion 9 to bring about a complete oscillation of the pawl 36 as a result of each opening and subsequent closure of the lid 8.

The pawl 36 with the unidirectional stop tooth 32 and the set of teeth 23 formed on the edge of the disc 16 constitute an escapement ratchet mechanism for the stepped rotation of the disc 16 upon each opening and subsequent closure of the lid 8.

It can be seen that, as it rotates about its own axis, the disc 16 can pass over both the tooth 32 and the tooth 37 owing to the resilience of its mounting on the peg 17.

The vessel just described operates as follows. The water to be filtered is first introduced into the container 5 after the lid 8 has been removed. When the lid is removed, the pawl is pivoted in the sense indicated by the arrow A under the action of the spring 35 and the stop tooth 37 formed thereon is made to pass over the tooth adjacent that previously engaged by sliding on the inclined planes of the sides 25a, 25b thereof.

The pawl is thus prepared for entraining the disc 16 upon subsequent closure of the container by means of the lid 8.

When this occurs, the engagement between the catch

projection 12 on the container and the cam profile 38 on the pawl causes the latter to pivot about its own axis in the sense indicated by the arrow B, entraining the display disc by one step.

When, however, upon completion of the thirtieth opening and closure cycle of the lid 8, the unidirectional stop tooth 37 of the pawl 36 is brought to the bridge-like cross-piece 27 between two adjacent teeth 23, whereas the unidirectional stop tooth 32 correctly prevents the disc from rotating backwards, any further rotation of the disc 16 is prevented, possibly with the display through the window 30 of an indication advising that the cartridge 11 should be replaced.

In the variants of the vessel of the invention, similar or functionally equivalent details are indicated by the same reference numerals as in the embodiment just described. The vessel of Figures 5 to 7 differs from the embodiment described in that the spring 35 is formed integrally with the pawl 36. The remaining details and the operation of the counting device are equivalent to those of the vessel 1.

The vessel of Figures 8 to 10 differs from the previous one in that, instead of the display disc, it has a drum-like counting device 40 supported for rotation between two shoulders 41a, 41b and rotated in steps about its own axis by an escapement ratchet mechanism 42 of which the pawl, indicated 43, is supported on the lid 8 on a pin 48 and is acted on resiliently by a spring 49. The pawl 43 comprises a resilient arm 44 carrying two hooks 45a, 45b, each in engagement with a respective set of teeth 46a,

46b and is pivoted about the pin 48 by interference with the catch projection 12 upon each opening and subsequent closure of the lid onto the container 5.

In the vessel of Figures 11 to 13, the pawl 36 is slidable longitudinally on the lid 8 rather than being pivotable. The cam profile 38 is a profile with an inclined plane cooperating with a corresponding inclined plane 50 on the catch projection 12. On one side, the pawl 36 bears a resilient arm 51 on the free end of which a hook 52 is formed; on the opposite side, the pawl has a catch formation 53 for limiting the rotation of the display disc 16 in one sense.

The display disc 16 has a plurality of teeth 54 with sawtooth profiles on its upper face facing the surface 21 of the lid 8.

The embodiment of Figures 14 to 16 differs from the previous embodiment essentially in that, in this embodiment, the catch-like formation 53 is replaced by a separate hook 60 mounted for limited pivoting on the lid 8 with the ability for an arm 61 of the hook 60 to catch against a lateral wall 62 of the lid 8.

Further embodiments of the vessel of the invention are described with reference to Figures 17 to 19. All of these embodiments have in common the fact that the counting device 15 associated with the lid 8 of the vessel has electronic counting means which enable the number of openings and closures of the vessel 1 carried out to be memorized in order to warn the user automatically by a signal, for example, a sound or visual

signal, that the filter cartridge 11 should be replaced.

Provision is also made for the insertion of a suitable timer in the device for warning that the cartridge 11 has expired, for example, owing to age, and should therefore be replaced regardless of the number of openings and closures of the lid 8.

In the embodiment shown in Figure 17, the count which can be read in the display 71 visible through the window 30 is operated by the catch projection 12 which operates a push-button 70 mounted on the electronic counting device 15 fixed to the lid 8.

In the embodiment shown in Figure 18, the electronic counting device 15 is operated by a lever 80 a front portion 81 of which acts on the push-button 70 which, upon the closure of the lid 8 also rotates the numbering on the display 71 visible on the upper wall of the electronic device 15.

In a further variant of the device of the invention, the display 71 (Figure 19) is operated by a magnetic mass 90 acted on by a magnet 91 mounted on the receptacle 9.

Naturally, an attraction or repulsion effect of the magnet 91 on the magnetic mass 90 may be provided for without distinction.

CLAIMS

1. A vessel for filtering liquids, particularly drinking water, comprising a container (5) for the liquid to be filtered and an openable lid (8) on the container for access thereto, characterized in that it comprises a counting device (15) associated with the container (5) and/or the lid (8) for detecting and counting the occasions on which access is gained to the container (5) by means of the lid (8).
2. A vessel according to Claim 1, in which the counting device (15) comprises a ratchet mechanism (16, 36) mounted on the lid (8) or on the container (5) and operatively associated with a display (16), the ratchet mechanism comprising an operating catch projection (12) cooperating with a profile (38) on the container (5) or on the lid (8), respectively, in order to advance the display (16) in steps as a result of each opening and closure of the lid (8).
3. A vessel according to Claim 2, in which the ratchet mechanism is of the escapement type.
4. A vessel according to Claim 3, in which the ratchet mechanism and the display (16, 36) are mounted on the lid (8) and the operating catch projection (12) is formed on the container in a position such as to interfere with the profile (38) during the opening and closure of the lid (8).
5. A vessel according to Claim 3, in which the ratchet mechanism comprises a toothed disc-shaped element (16)

and a pawl (36) acting on the teeth (23) of the disc-shaped element (16), both being engaged on the lid (8) coaxially with one another.

6. A vessel according to Claim 1, in which the counting device (15) is electronic or electro-mechanical and comprises a pulse generator (12, 70; 81, 70; 90, 91) which can generate a pulse for each opening and/or closure of the lid (8), a counter (15) for counting the pulses generated by the generator and a display (71) for displaying the pulses counted.

1 / 6

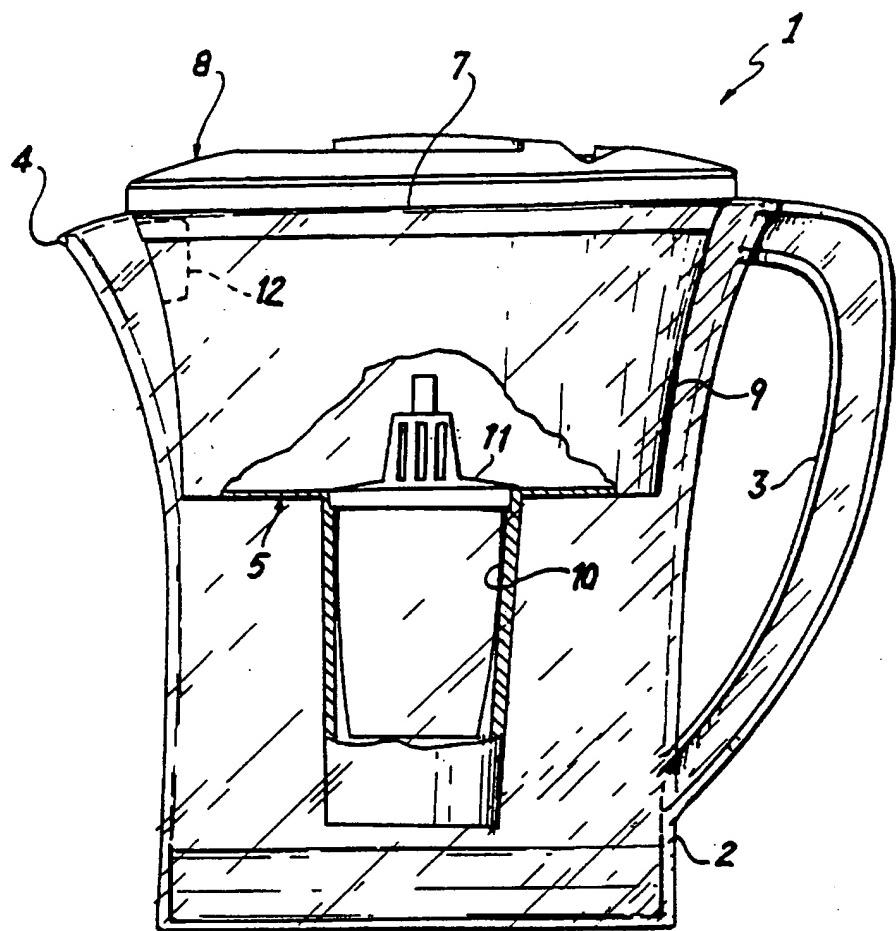


Fig. 1

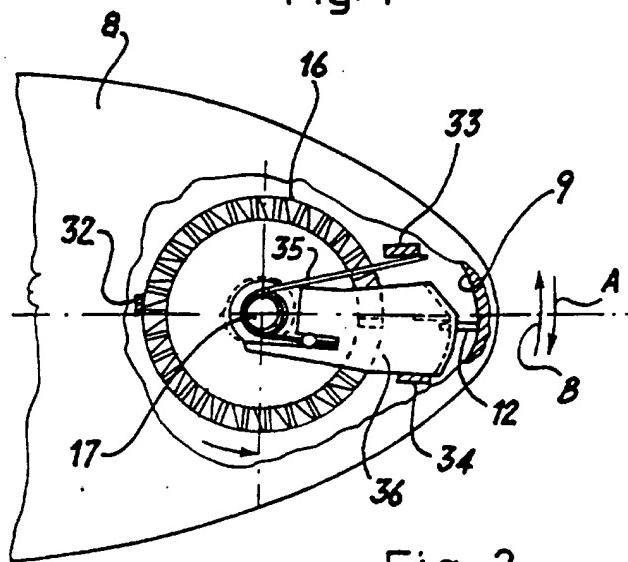


Fig. 2

2 / 6

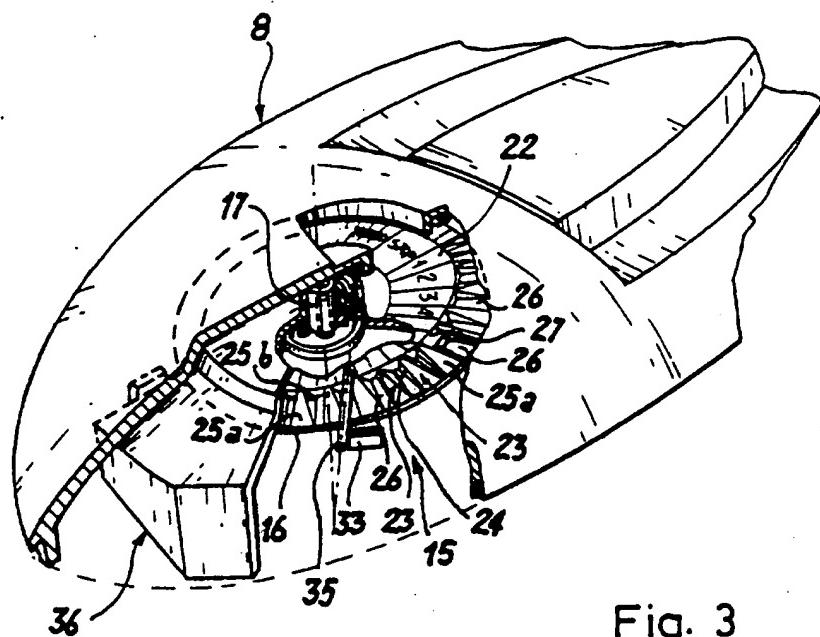


Fig. 3

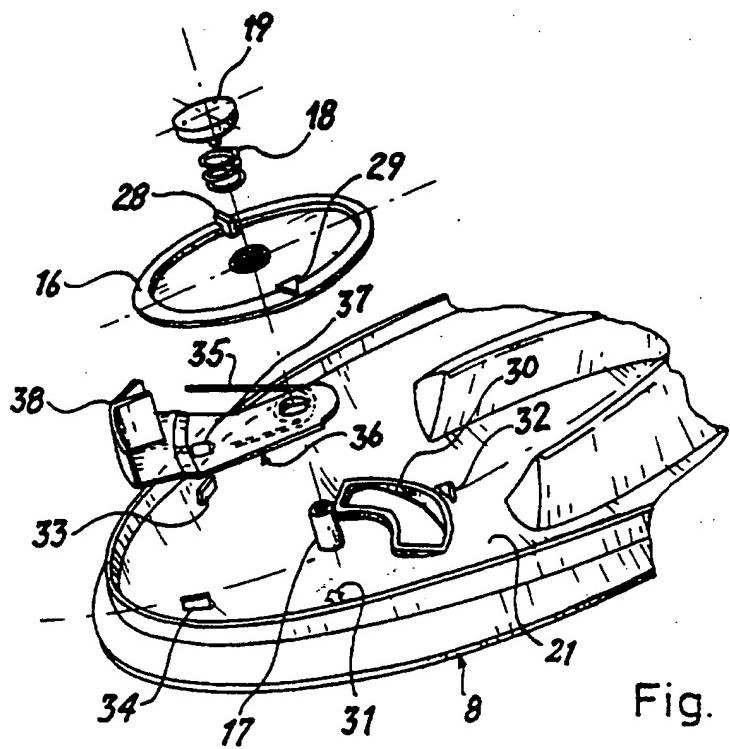
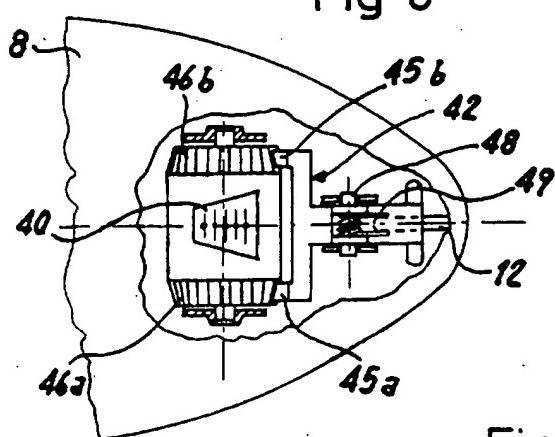
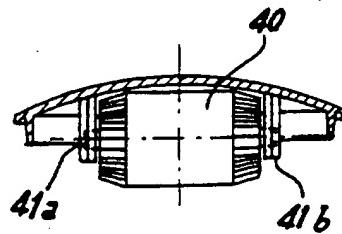
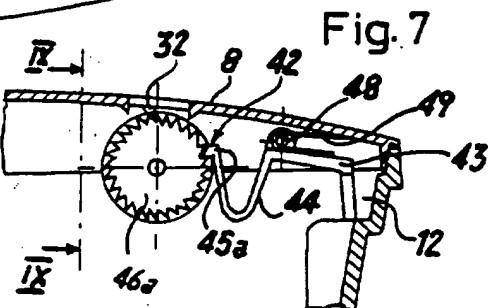
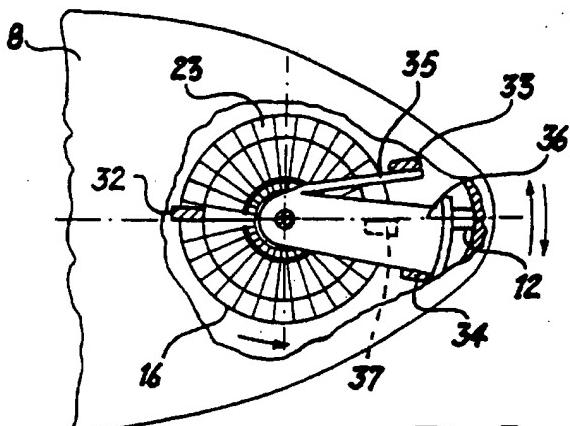
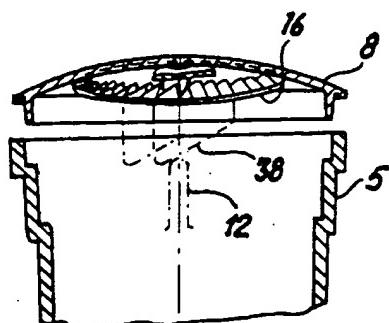
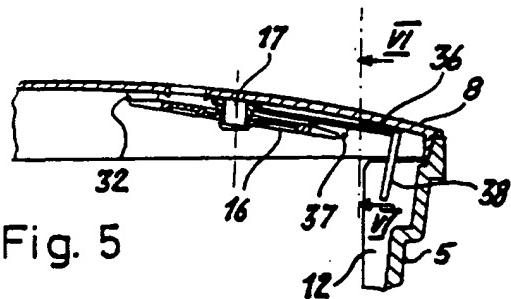


Fig. 4



4 / 6

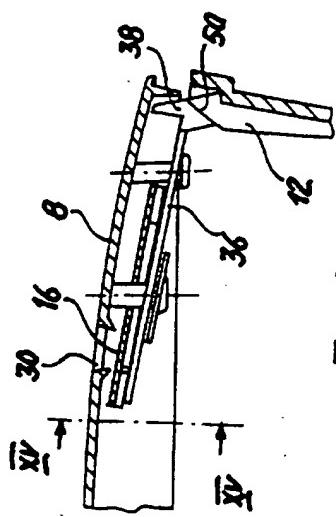


Fig. 11

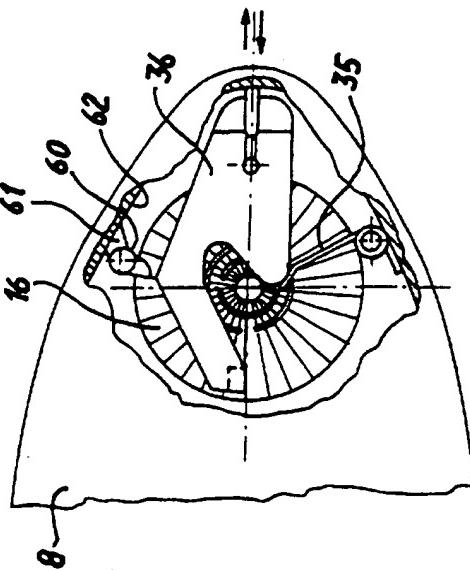


Fig. 14

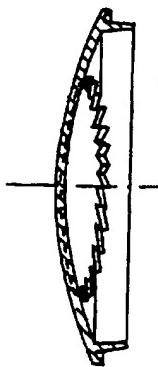


Fig. 12

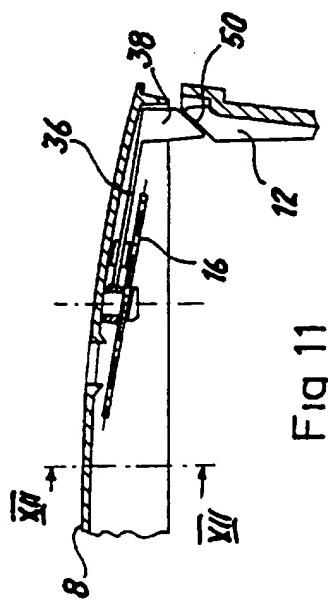


Fig. 11

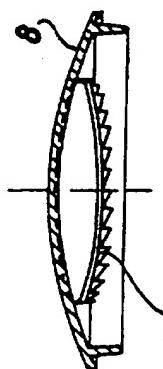


Fig. 15

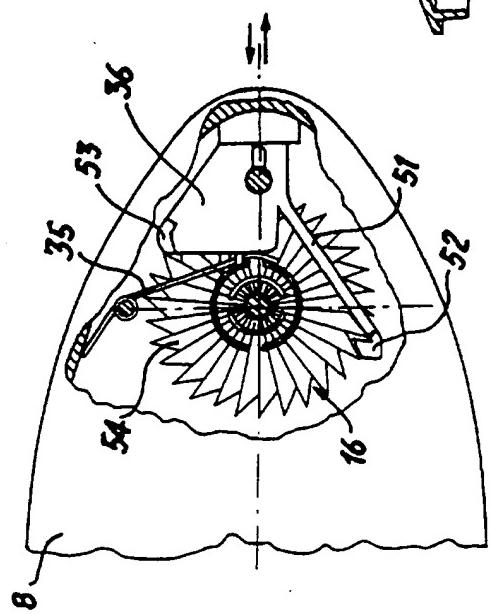


Fig. 13

Fig. 16

5 / 6

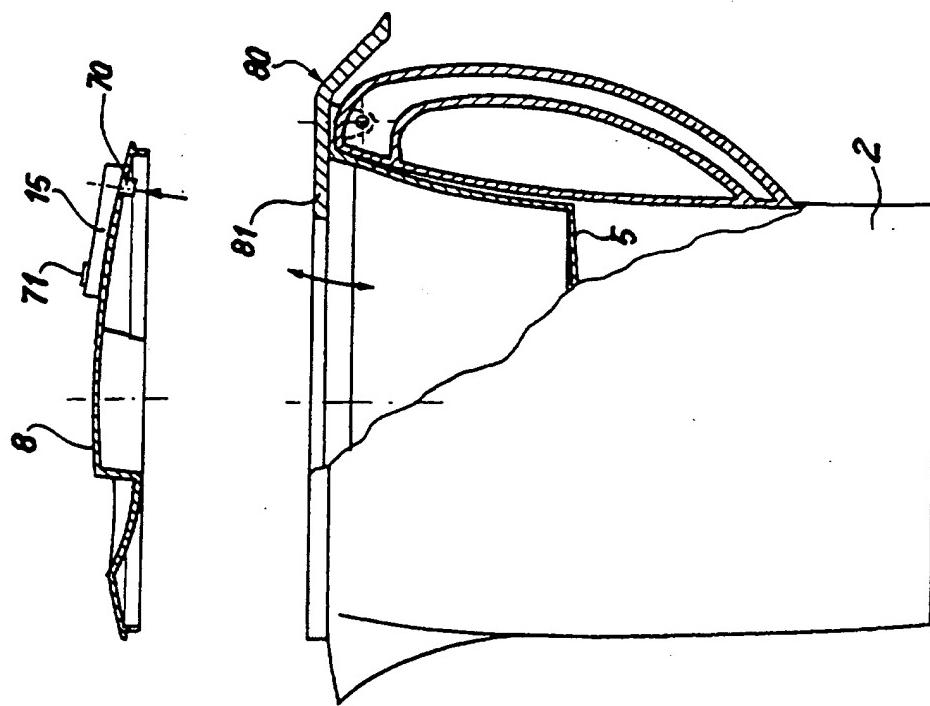


Fig. 18

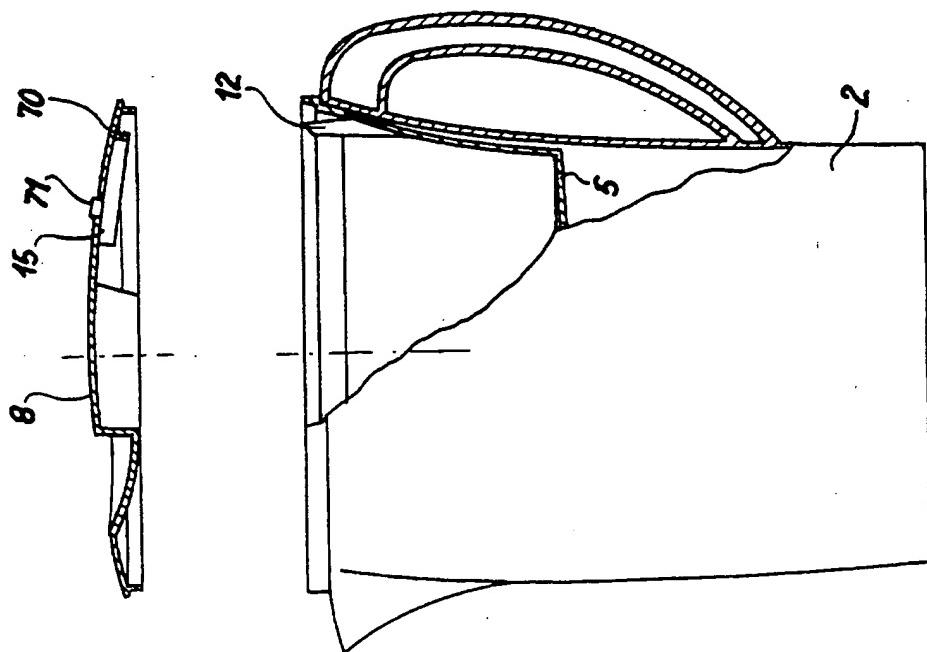


Fig. 17

6 / 6

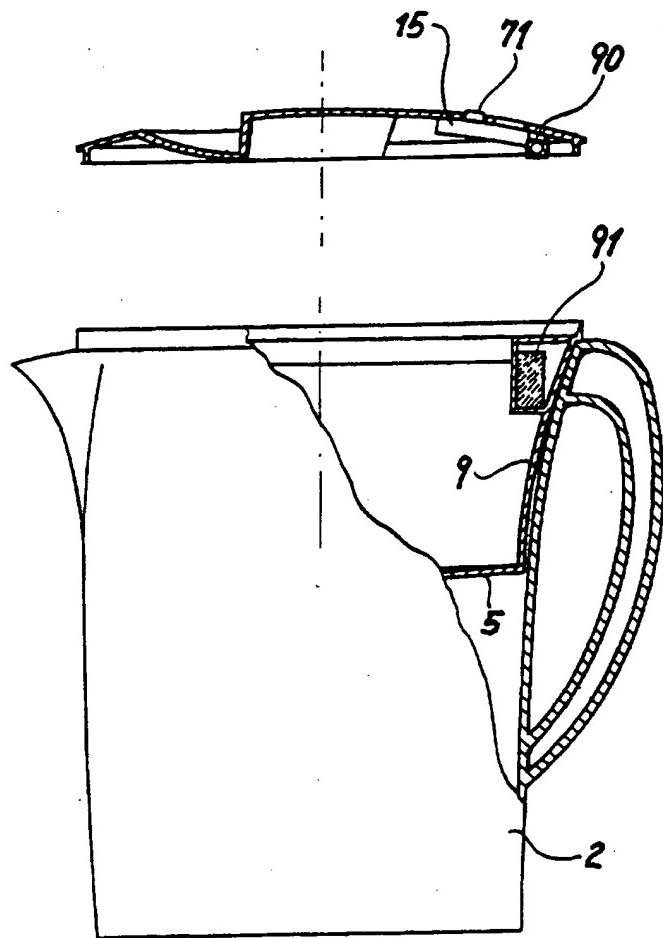


Fig. 19

INTERNATIONAL SEARCH REPORT

Int'l Application No

PCT/EP 95/04231

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 6 B01D35/143 C02F1/00 A47G19/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B01D C02F A47G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US-A-5 190 643 (J.K. DUNCAN ET AL.) 2 March 1993 see column 7, line 28 - column 8, line 17; figures 1-8 ---	1-5
X, P	GB-A-2 288 529 (KENWOOD MARKS LIMITED ET AL.) 25 October 1995 see figures 1-4 ---	1-5
A	US-A-5 328 597 (N.K. BOLT, JR. ET AL.) 12 July 1994 see figures 1-13 -----	1-6

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 February 1996	11.03.96
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl. Fax. (+31-70) 340-3016	Authorized officer Kanoldt, W

INTERNATIONAL SEARCH REPORT

Information on patent family members

Internal Application No

PCT/EP 95/04231

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-5190643	02-03-93	AU-B-	3434093	03-08-93
		WO-A-	9313847	22-07-93
GB-A-2288529	25-10-95	AU-B-	2263495	16-11-95
		WO-A-	9529131	02-11-95
US-A-5328597	12-07-94	NONE		